

1 **Claims:**

2 What we claim is:

- 3 1. A user interface for volume sculpting comprising:
 - 4 a processor;
 - 5 a two-dimensional input device operably connected to the processor; and
 - 6 a display device operably connected to the processor and wherein the
 - 7 processor operates to provide on the display device a first view of a sculpting
 - 8 object and a second view of the object, the first view of the object providing a full,
 - 9 six-degree-of-freedom orientation control of the view.
- 10 2. The user interface of claim 1, wherein the first view comprises a cross-sectional
- 11 area of the object.
- 12 3. The user interface of claim 1, wherein the second view is fixed in orientation in
- 13 relation to the first view.
- 14 4. The user interface of claim 3, wherein the second view is fixed in position in
- 15 relation to the first view.
- 16 5. The user interface of claim 3, wherein the second view is orthogonal to the first
- 17 view.
- 18 6. A method of forming a model of a three-dimensional object comprising:
 - 19 generating a three-dimensional set of points;
 - 20 grouping the points into a plurality of three-dimensional cells;
 - 21 subdividing a cell in the plurality of cells into multiple subdivisions;
 - 22 locating adjacent cells that contact the subdivisions; and
 - 23 subdividing the adjacent cells to eliminate dangling points.
- 24 7. The method of claim 6, wherein the generating step comprises generating a set of
- 25 voxels as the set of points.
- 26 8. The method of claim 6, wherein the grouping step comprises grouping the points
- 27 into cubic cells.
- 28 9. The method of claim 6, wherein the subdividing the cell step comprises forming
- 29 eight subdivisions.
- 30 10. The method of claim 6, wherein the subdividing the cell step comprises forming
- 31 twelve subdivisions.
- 32 11. The method of claim 6, wherein the subdividing the adjacent cells is performed
- 33 automatically.

- 1 12. The method of claim 6, wherein the subdividing the adjacent cells comprises
2 adding only one point per adjacent cell.
- 3 13. The method of claim 6, wherein the subdividing the cell comprises forming six
4 pyramids.
- 5 14. The method of claim 13, wherein the subdividing the cell comprises forming
6 twelve tetrahedra from the six pyramids.
- 7 15. The method of claim 6, further comprising removing at least one of the
8 subdivisions from the model.
- 9 16. The method of claim 6, further comprising reproducing at least one of the
10 subdivisions or cells and adding it to the model.
- 11 17. The method of claim 16, further comprising continuing to add subdivisions and
12 cells until a volume defined by the object has been filled.
- 13 18. The method of claim 17, further comprising selectively subdividing cells that are
14 outside of the volume.
- 15 19. The method of claim 18, further comprising removing portions of the cells that
16 have been subdivided.
- 17 20. The method of claim 6, further comprising assigning color values to the set of
18 points.